

# First report of *Carybdea xaymacana* Conant, 1897 (Cnidaria, Cubozoa, Carybdeida) in Colombia

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**Abstract.** *Carybdea xaymacana* Conant, 1897 is a box jellyfish belonging to the family Carybdeidae and is currently recorded from the Mexican Caribbean (State of Quintana Roo), Puerto Rico, the Bahamas, Jamaica, Panama, and Venezuela. Here, we report for the first time the presence of this species in Colombia, based on collections made in three departments of the Colombian Caribbean. Documenting the extension in the distribution range of this species is of great importance due to its ecological role in regional ecosystems.

**Key words.** Biodiversity, cubozoan, first record, geographic distribution

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## INTRODUCTION

Cubozoans (class Cubozoa Werner, 1973) comprise a subset of cnidarians commonly known as sea wasps or box jellyfish and distinguished by the shape of their umbrella. They predominantly inhabit the water column just above the seabed during daylight hours, ascending to the surface at night (Santhanam and Santhanam 2020). Cubomedusae are widely distributed throughout the world's oceans, and their presence can significantly impact ecosystems because of their roles as predators of macrozooplankton and fish larvae, as well as carriers of carbon to deeper ocean strata (Garm et al. 2012; Colin et al. 2013). However, their presence can also have significant negative effects on human well-being from multiple perspectives, including recreational, economic, cultural, and health aspects, especially in tropical areas where tourism and fishing activities predominate (Gershwin et al. 2010; Graham et al. 2014).

The class Cubozoa comprises 28 exclusively marine species, classified into two orders (Carybdeida Gegenbaur, 1857 and Chirodropida Haeckel, 1880) and eight families (Collins 2024a). Particularly, the family Carybdeidae Gegenbaur, 1857 is monotypic, containing only the genus *Carybdea* Péron & Lesueur, 1809. It includes nine valid species, which are distinguished by possessing a heart-shaped rhopalial niche ostium covered by a triangular scale and epaulette-shaped gastric phacellae located at each corner of the stomach (Karunarathne and de Croos 2020; Collins 2024b).

In the Colombian Caribbean, knowledge of the class Cubozoa is limited, primarily focused on the geographic distribution of *Alatina alata* (Reynaud, 1830) and *Chiropsalmus quadrumanus* (F. Müller, 1859), both documented only from the Atlantic and Magdalena departments (Cedeño-Posso and Lecompte 2013; Oliveira et al. 2016; Durán-Fuentes et al. 2018). We document for the first time in Colombia the presence of the box jellyfish *Carybdea xaymacana* Conant, 1897, based on specimens collected in the subtidal zone in three departments of the Colombian Caribbean. Our new information highlights the necessity for continued scientific exploration in poorly studied areas and is of great importance for advancing our understanding of the biology of *C. xaymacana*.

## METHODS

Twenty-nine specimens of *Carybdea xaymacana* were collected at Punta Bonita (Department of Córdoba) and Isla Fuerte (Department of Bolívar) (Figure 1) on 19 November 2022 and 16 November 2023,



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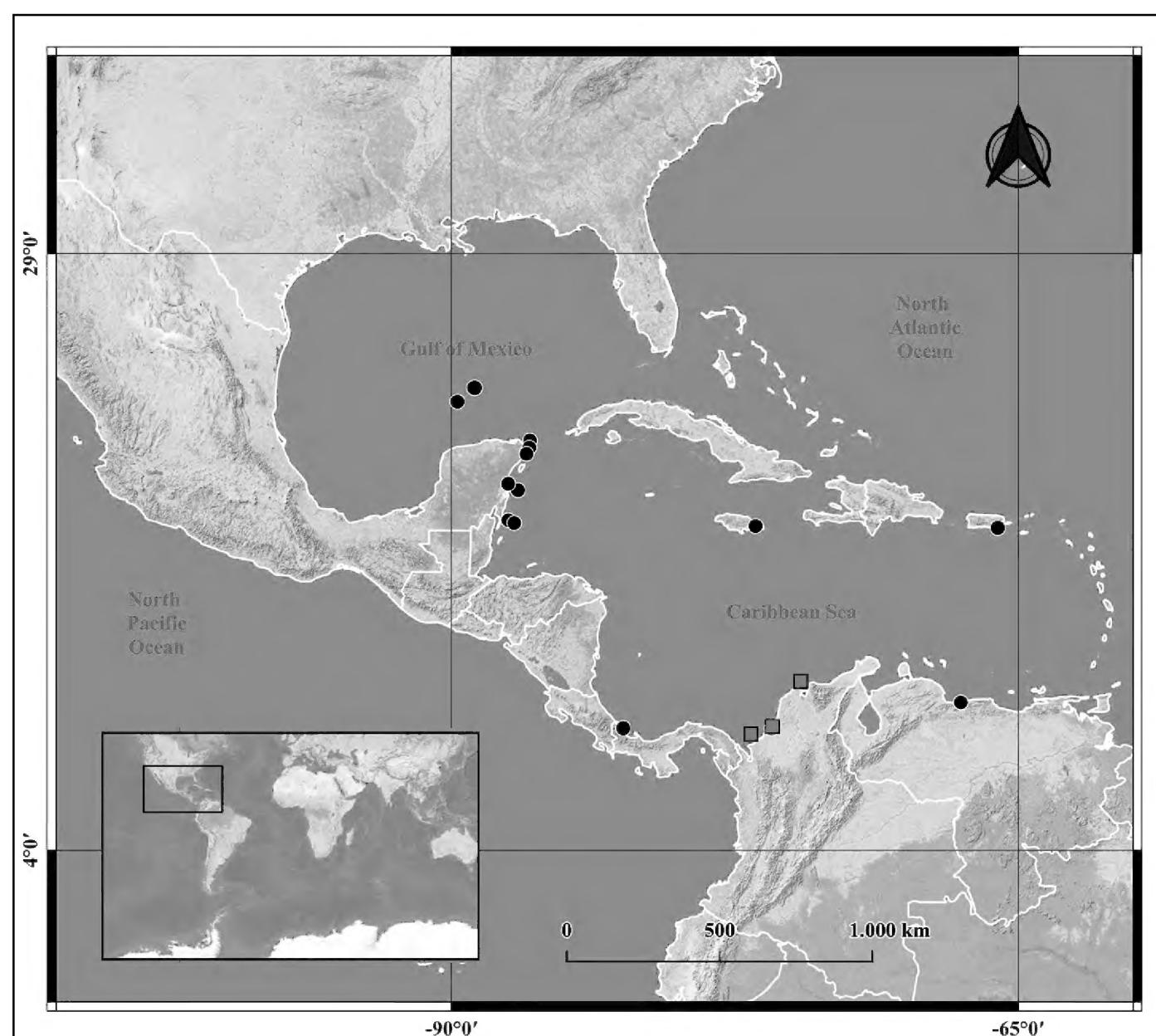
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**Figure 1.** Distribution of *Carybdea xaymacana* Conant, 1897; black circles = previous records; red squares = new localities in Colombia.



respectively. Individuals were captured directly from the surface using a 50 × 50 cm net constructed with PVC tubes and Marquisette cloth. The specimens were fixed in a 4% formalin solution in seawater and transported to the Molecular Biology Laboratory of the University of Córdoba. Additionally, we reviewed four samples of *Carybdea* stored in the Biological Collection of the University of Magdalena (Pertuz et al. 2023).

We analyzed and compared the morphological characteristics of the velarial canals, pedalial knee, and gastric phacellae, following the descriptions provided by Conant (1897) and Acevedo et al. (2019). All photographs were obtained using Pixel Pro v. 3.1 software with a Luxeo 6Z stereomicroscope with a built-in digital camera. The specimens collected were deposited in the Zoology Laboratory of the University of Córdoba (LZUC-CD) as reference material. The catalog numbers of each lot are listed in Materials examined.

## RESULTS

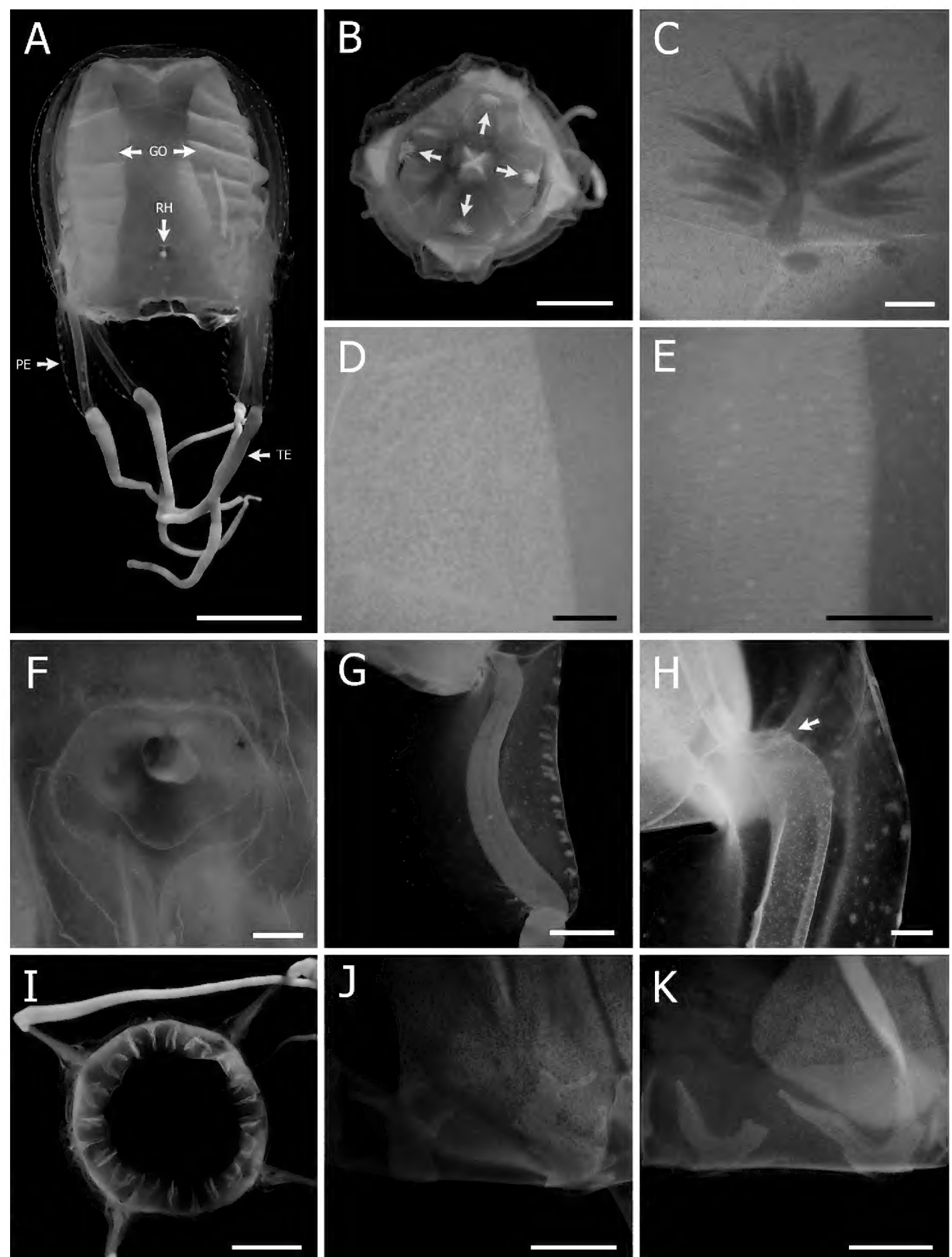
Phylum Cnidaria Hatschek, 1888  
 Subphylum Medusozoa Petersen, 1979  
 Class Cubozoa Werner, 1973  
 Order Carybdeida Gegenbaur, 1857  
 Family Carybdeidae Gegenbaur, 1857  
 Genus *Carybdea* Péron & Lesueur, 1810

### *Carybdea xaymacana* Conant, 1897

Figure 2

**New records.** COLOMBIA – MAGDALENA • Santa Marta, Aeromar Beach, Simón Bolívar International Airport sector; 11°07'06.60"N, 074°13'59.94"W; 1 m depth; 17.IV.2010; S. Quiroga leg.; 1 ♂, 2 ♀, 1 sex indet., UMAG-CBUMAG CNI:00002 – CÓRDOBA • San Antero, Cispata Bay, Punta Bonita sector; 09°24'13"N, 075°46'30"W; 1 m depth; 19.XI.2022; J. Llorente Vega and C. Nisperuza Pérez leg.; 6 ♂, 8 ♀, LZUC CD-C-0016 – BOLÍVAR • Cartagena, Isla Fuerte, Cebolleta Beach; 09°23'15"N, 076°10'22"W; 1 m depth; 16.XI.2023; J. Llorente Vega and C. Nisperuza Pérez leg.; 6 ♂, 8 ♀, 1 sex indet., LZUC CD-C-0103.

**Identification.** According to Acevedo et al. (2019), *C. xaymacana* can be identified by the presence of four single-rooted gastric phacellae, which are epaulette-shaped and located at each corner of the stomach; four simple, flattened, scalpel-shaped pedalial; diamond-shaped pedalial canals at its base, with a triangular knee bend; and two wide bifurcated velarial canals per octant.



**Figure 2.** *Carybdea xaymacana* Conant, 1897. **A.** Preserved specimen. **B.** Aboral view of gastric phacellae. **C.** Single-rooted gastric phacellous. **D.** Macro view of a female gonad. **E.** Macro view of a male gonad. **F.** Heart-shaped rhopalial niche ostium. **G.** Scalpel-shaped pedalia. **H.** Triangular-shaped knee bend, with a small beak-shaped appendage. **I.** Velarial canals. **J.** Velarial octant with dendritic-shaped canals. **K.** Velarial octant with pointed canals. Abbreviations: GO = gonads; RH = rhopalia; PE = pedalia; TE = tentacle. Scale bars: A, B, I = 10 mm; C–F, H = 0.5 mm; G, J, K = 2 mm.

**Observations.** The cubomedusae present a transparent and whitish cube-shaped umbrella after preservation, with small nematocyst warts and a subtle horizontal constriction in the apical zone. The gastrovascular cavity is flat, radially connected to four gastric pouches and to the manubrium at its base. The gastric phacellae, which are single-rooted and epaulette-shaped, are found at all corners of the stomach. Additionally, there are four rhopalia on each side of the umbrella, which features a heart-shaped rhopalial niche ostium covered in the upper part by a triangular scale with its rounded angle. The gonads are compressed and leaf-shaped.

Furthermore, there are four simple unbranched pedalia, which are flattened, scalpel-shaped, and positioned at every interradial corner, with lined nematocyst warts along the external margin and occasionally exhibiting undulations in the inner border. Each pedalia has an internally positioned pedalian canal, which is diamond-shaped in cross-section, triangular at the knee flexion, and with a minuscule beak-shaped appendage the outer curvature. The velarium has two wide canals per octant, and four per quadrant, which are not strictly mirror images of each other. These canals are typically bifurcated, pointed, or dendritic, with two or more branches. The canals flanking the frenulae are simpler and smaller, sometimes bifurcating or sometimes not, and occasionally there is a lateral branch of lesser length. In contrast, the canals bordering the pedalia exhibit greater complexity, being bifurcated and with lateral branches.

Based on the characteristics mentioned by Sansores-Flores et al. (2023), of the 33 specimens studied, 13 are males, 18 are females, and two are undetermined. The width of the umbrella ( $\bar{x} = 23.34 \pm 3.26$  mm) is greater than its height ( $\bar{x} = 21.16 \pm 3.12$  mm).

**Remarks.** *Carybdea xaymacana* was initially described from Kingston Harbour, Jamaica (Conant 1897) and later reclassified as *C. marsupialis xaymacana* (Bigelow 1938). Subsequently, both *C. xaymacana* and *C. murrayana* were identified by Kramp (1961) and Studebaker (1972) as synonyms of *C. marsupialis*; however, Gershwin (2005) proposed their separation as independent species. Finally, Acevedo et al. (2019) revised the taxonomy of the genus and recognized *C. xaymacana* as a distinct species based on morphological attributes that differentiate it from other *Carybdea* species.

## DISCUSSION

*Carybdea xaymacana* is widely distributed in the Caribbean region where it is the only species of *Carybdea* genus (Acevedo et al. 2019). Initially described in the port of Kingston, Jamaica (Conant 1897), it has since been documented in Caribbean Mexico (Quintana Roo), the Bahamas, Puerto Rico, Panama, and Venezuela (Gershwin 2006; Acevedo et al. 2019; Chuard et al. 2019; Sansores-Flores et al. 2023). We add the first records of this species from Colombia, based on individuals collected in the departments of Bolívar, Córdoba, and Magdalena (Figure 1).

Previous studies on jellyfish along the coasts of Colombia have not included this species (Cedeño-Posso and Lecompte 2013; Durán-Fuentes et al. 2018). This could be because the greatest sampling effort has been conducted in the departments of Atlántico and Magdalena. Therefore, future studies covering the coastal zones of the various other Caribbean departments of the Colombia are necessary to build a detailed inventory of these organisms. In this context, the cubomedusa fauna of the country is currently represented by *A. alata* and *C. quadrumanus*, which can be easily distinguished from *C. xaymacana* mainly by having long gastric cirri and T-shaped rhopaliar niche, and branched tentacles, respectively (Kramp 1961; Lewis et al. 2013).

Two recent sightings of box jellyfish identified as *C. xaymacana* have been reported on the iNaturalist platform. These sightings occurred in the localities of Reserva Natural Sanguaré, department of Sucre (Puer-tas 2021), and Isla Fuerte (Lengua 2023). These records fall within the potential geographic distribution of the species. However, this information should be handled with caution, as the identifications are from photographs without rigorous examination of actual specimens. For accurate determination, an analysis of morphological characteristics of the gastric phacellae, rhopaliar niche, pedalial structures, and velarial canals is necessary (Acevedo et al. 2019).

Our specimens conform to the descriptions documented of *C. xaymacana* by Conant (1897) and Acevedo et al. (2019) in exhibiting short gastric cirri, a heart-shaped rhopaliar niche, simple pedalia, pedalial canal knee with a beaked appendage, and two velarial canals per octant. However, given its wide geographic distribution and isolated subpopulation assemblages, Bentlage et al. (2010) suggested that cryptic species may exist within those recognized as *C. xaymacana*. To confirm this, morphological variation and molecular analyses of populations are needed (Sansores-Flores et al. 2023).

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## ADDITIONAL INFORMATION

### Conflict of interest

The authors declare that no competing interests exist.

### Ethical statement

No ethical statement is reported.

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### Author contributions


Conceptualization: JLLLV, CANP, JAQR. Data curation: JLLLV. Formal analysis: JLLLV, CANP, CCP, JAQR. Funding acquisition: JAQR. Investigation: JLLLV, CANP, CCP, JAQR. Methodology: JLLLV. Resources: JLLLV, CANP, CCP. Supervision: CANP, JAQR, CCP. Visualization: JLLLV. Project administration: CANP, JAQR. Software: JAQR. Validation: CANP, CCP, JAQR. Writing – original draft: JLLLV. Writing – review and editing: JLLLV, CANP, CCP, JAQR.



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**Data availability**

All data that support the findings of this study are available in the main text.

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